

Claims

- [c1] A method for utilizing a three-wire programming box with a motor control circuit, said method comprising the steps of:
 - providing a three-wire to two-wire interface; and
 - connecting the three-wire to two-wire interface between the three-wire programming box and the motor control circuit such that the three-wire programming box communicates bi-directionally with the motor control circuit utilizing less than three connections between the three-wire to two-wire interface and the motor control circuit.
 - [c2] A method according to Claim 1 wherein said step of providing a three-wire to two-wire interface comprises the step of providing a three-wire to two-wire interface including a circuit electrically equivalent to an input circuit of the motor control circuit.
 - [c3] A method according to Claim 1 wherein said step of providing a three-wire to two-wire interface comprises the step of providing a three-wire to two-wire interface including a circuit electrically equivalent to a diode bridge rectifier input circuit of the motor control circuit.
 - [c4] A method according to Claim 1 wherein said step of providing a three-wire to two-wire interface comprises the step of providing a three-wire to two-wire interface including a circuit electrically equivalent to an input circuit of the motor control circuit, wherein the circuit is connected to a comparator in an impedance bridge with the input circuit.
 - [c5] A method according to Claim 1 wherein said step of providing a three-wire to two-wire interface comprises the step of providing a three-wire to two-wire interface including a circuit electrically equivalent to a diode bridge rectifier input circuit of the motor control circuit, wherein the circuit is connected to a comparator in an impedance bridge with the input circuit.
 - [c6] An interface circuit for interfacing with a motor control circuit including a first input circuit, said interface circuit comprising a three-wire to two-wire

- interface comprising a second input circuit electrically equivalent to the first input circuit of the motor control circuit.
- [c7] A circuit according to Claim 6 further comprising a comparator connected to both said second input circuit and the first input circuit.
- [c8] A circuit according to Claim 7 wherein said comparator connected to both said second input circuit and the first input circuit forming an impedance bridge.
- [c9] A circuit according to Claim 6 wherein said second input circuit comprises a diode bridge rectifier.
- [c10] A circuit according to Claim 8 wherein said second input circuit comprises a diode bridge rectifier.
- [c11] A motor control and testing circuit comprising:
a first input circuit;
a second input circuit coupled to said first input circuit;
a microcontroller connected to said second input circuit;
a first output circuit coupled to said microcontroller; and
a second output circuit coupled to said first output circuit, said second output circuit connected to said first input circuit and configured to send outputs from said microcontroller to said first input circuit.
- [c12] A circuit according to Claim 11 further comprising a three-wire to two-wire interface circuit connected to said first input circuit, said three-wire to two-wire interface circuit comprising a third input circuit electrically equivalent to said first input circuit.
- [c13] A circuit according to Claim 11 further comprising a three-wire to two-wire interface circuit connected to said first input circuit, said three-wire to two-wire interface circuit comprising:
a third input circuit electrically equivalent to said first input circuit; and
a comparator, said third input circuit and said first input circuit connected to

- said comparator forming an impedance bridge.
- [c14] A circuit according to Claim 13 wherein said third input circuit comprises a diode bridge rectifier circuit.
- [c15] A circuit according to Claim 11 wherein said second input circuit coupled to said first input circuit with an optocoupler, said second output circuit coupled to said first output circuit with an optocoupler, said second output circuit connected to said first input circuit by a Zener diode at a rectified output of said first input circuit.
- [c16] A motor control and testing circuit comprising:
a first input circuit;
a second input circuit coupled to said first input circuit;
a microcontroller connected to said second input circuit;
a first output circuit coupled to said microcontroller;
a second output circuit coupled to said first output circuit, said second output circuit connected to said first input circuit and configured to send outputs from said microcontroller to said first input circuit;
a third input circuit electrically equivalent to said first input circuit; and
a comparator, said third input circuit and said first input circuit connected to said comparator forming an impedance bridge.
- [c17] A circuit according to Claim 16 wherein said third input circuit comprises a diode bridge rectifier circuit.
- [c18] An electrically commutated motor comprising:
a housing;
a stator comprising a plurality of windings and a bore therethrough, said stator mounted in said housing;
a rotor shaft extending at least partially through said bore;
a rotor core mounted on said rotor shaft, said rotor core comprising a plurality of magnets;
a commutator connected to said windings; and

a motor control and testing circuit connected to said commutator, said motor control and testing circuit comprising:

- a first input circuit;
- a second input circuit coupled to said first input circuit;
- a microcontroller connected to said second input circuit;
- a first output circuit coupled to said microcontroller;
- a second output circuit coupled to said first output circuit, said second output circuit connected to said first input circuit and configured to send outputs from said microcontroller to said first input circuit;
- a third input circuit electrically equivalent to said first input circuit, and
- a comparator connected to said first input circuit and said third input circuit forming an impedance bridge.

[c19] A motor according to Claim 18 wherein said third input circuit comprises a diode bridge rectifier circuit.

[c20] A motor according to Claim 18 wherein said second input circuit coupled to said first input circuit with an optocoupler, said second output circuit coupled to said first output circuit with an optocoupler, said second output circuit connected to said first input circuit by a Zener diode at a rectified output of said first input circuit.